

# **Implications of Illustrative Examples Analysis for Washington State Tolling Policy – Progress Update**

The interim report recommended a tolling policy for Washington State that uses pricing to encourage effective system management and congestion relief and provides a supplementary source of funding for appropriate projects. The report suggests that determining how and where tolling should be used should be based on consistent standards that recognize not only localized benefits but also potential negative system impacts. We have analyzed a few illustrative examples of potential tolling applications to put the policy framework to a practical test. This briefing paper describes the findings that are starting to emerge from these first tests, recognizing that additional analysis will be done in the next month, with further details on each test case provided in the one-page summaries that follow.

## **Early Indications of Implications on Tolling Policy**

The bottom line of our analysis so far points towards a few basic recommendations:

1. Conversions of HOV lanes to HOT lanes is a proven, relatively inexpensive way to use excess capacity and preserve transit and vanpool performance. Following the example of the SR 167 HOT lane pilot project, additional HOV to HOT lane conversions should be considered in the short to medium term.
2. Using tolls to help fund bridge, or bridge-like improvement projects (including Snoqualmie Pass) is an effective finance tool that also can be used to influence travel behavior to improve system performance when used carefully. These tolling applications also can be considered in the short to medium term.
3. The cost and benefits of building additional HOT lane capacity should be carefully weighed against the risk that this type of project will be made obsolete by more extensive road pricing applications that come about over time. This choice does not have to be made right away, but can be addressed with additional study.
4. Tolling the Cross Base Highway is expected to pay for only 15 percent of the capital cost of the project (after subtracting out operations expenses), making it a poor candidate for tolling.

## **Converting Carpool Lanes – Easy and Effective in the Short Term**

Converting existing carpool lanes (HOV lanes) to high-occupancy toll (HOT) lanes is a relatively easy way to use price to maximize the effectiveness of a highway lane, and provide a relief valve for people when they absolutely need to be somewhere on time. This has been demonstrated in projects now in operation in San Diego and Minnesota. In the very near future, some parts of the HOV lane system will fill up with two-person carpools,

and Washington needs to be prepared to make the policy choices that will keep those lanes functioning properly to support the regional transit and vanpool system. These choices will be needed whether or not HOT lanes are developed, but the tolling component adds an element of complexity and opportunity to the decisions. At these decision points, pricing provides the opportunity to manage the resulting system. It is important to keep in mind, however, that there are significant technical challenges to tolling larger systems of toll lanes.

## **Building Multiple-Lane HOT Systems Have Potential Value, But Washington Should Do More Study of Alternatives before Proceeding**

Investing in construction of additional capacity to create two HOT lanes in each direction on a freeway is a natural extension of HOV to HOT lane conversions. Such facilities would provide even more capacity for more reliable and faster travel times on freeways, but they are quite expensive to build, especially when considering direct connections from one route to another. Our analysis of a toll lane system on SR 167 and I-405 showed us that forecasted future (2030) traffic demand may be so high in the Puget Sound region that only very high prices would keep these special lanes flowing freely.

The lead times to plan, design, and construct these special lanes is considerable. Over that time period, the technology to allow tolling on all facilities is likely to become more feasible. At the same time, concerns over the viability of the fuel tax to fund transportation are likely to be more severe, as fuel-efficient vehicles become more prevalent. These conditions may lead to fundamental changes in how users pay for transportation. If there is a reasonable chance that more extensive use of road pricing may occur in 20 to 30 years, should we invest extensive resources in building special purpose lanes that may become obsolete? This is a question that we do not necessarily have to answer right now, but should be answered before any significant commitments to multiple special lane arrangements involving pricing.

## **Bridges Are Natural Tolling Candidates, But Tolling Should Be Applied Cautiously**

Bridges are natural candidates for tolling because they are so expensive to build, there are potentially few diversionary alternatives, and tolls can contribute a revenue stream to help pay for the needed improvement. Moreover, applying tolls at one or two locations in the transportation network is a convenient way to use tolling as a traffic management tool. Our analysis of tolling both Lake Washington crossings (SR 520 and I-90) in 2030 showed us that if we set tolls to keep traffic across the Lake flowing at a minimum of 45 miles per hour (to maximize the available capacity), then we might have to set the tolls so that overall system performance degrades from altered travel patterns. Experience at bridges in other places shows that modest variation in tolls by time of day can influence travel behavior and provide benefits. In applying tolls to existing toll-free crossings, Washington can move firmly but cautiously into traffic management solutions on bridge crossings.

One question we have not definitively answered is whether tolling both SR 520 and I-90 is needed to maintain balance in the Trans-Lake system. As traffic grows over the next decade or two, congestion on both sides of the Lake will be such that I-90 will be less of a diversion route for most trips. Regardless, there is a compelling argument that the entire Trans-Lake corridor should be treated as a system, including transit, and that a consistent policy on tolls should be applied if only to achieve geographic equity.

## **Tolling a Mountain Pass Is Conceptually Just Like Tolling a Bridge**

Tolling Snoqualmie Pass presents a unique opportunity to provide additional funding for much needed safety and reliability projects. A key link in the I-90 east-west corridor that spans the United States, the Snoqualmie Pass is frequently closed, or in danger of closing due to rockslides, road conditions, and avalanches. Preliminary WSDOT estimates of potential improvement projects on the pass range from \$300 million to \$600 million or more in 2000 dollars. Tolling at a modest level starting at almost \$4 in each direction in 2009 could raise \$533 million in project costs, as well as pay for enhanced maintenance activities. At these rates, we would expect about five percent of the traffic to divert from the Pass, to either alternative routes or other destinations on one side of the pass. The toll level could be set to meet Washington's revenue or policy needs in that corridor.

## **Cross Base Highway Is Expected to Fund Only 15 Percent of Project Costs with Tolls**

The proposed Cross Base Highway project is more of a traditional toll road development project, in that the tolls would help fund construction of a brand new corridor. With a toll rate starting at \$1.40 in 2011, traffic at the proposed tolling location on this highway would be expected to be about 11,500 per day, about 57 percent of the volume that would be expected if the highway were untolled. At these rates, and assuming toll rates keep track with inflation, the project might contribute \$34 million towards construction costs, about 15 percent of the full amount. These relatively conservative estimates could easily be exceeded if additional development is induced in the corridor because of the improved access. Since this corridor serves one of the lowest-income areas of Pierce County, income equity issues are an important consideration here.

## **Financing the System and Setting Prices**

Estimating how much tolls could fund capital improvements required us to make some basic assumptions. The Interim Report suggests that Washington should use tolls for transportation system enhancements, and should avoid funding mechanisms tied to the revenues of one project. Even though the Tacoma Narrows Bridge financing uses tolls to pay back bonds, the bonds are really an obligation of the state gas tax. This enabled the debt service coverage ratios to be very low – approaching 1.0. However, as more projects take advantage of tolls as part of their finance plan, the gas tax can only be pledged so many times. Therefore, we assumed that higher coverage ratios would be required for the

toll-oriented portion of financing of the illustrative example projects – about 1.75 times debt service in any particular year. These assumptions produce conservative estimates of funding capacity for this planning study.

As projects move closer to finance, it is likely that additional funding capacity can be created through innovative finance mechanisms such as subordinate debt mechanisms (which may not be investment grade) or Federal government-backed loans (called TIFIA loans). These might yield up to another 30 percent in funding capacity.

Our financing assumptions also assumed that toll rates would increase annually to track inflation. This is becoming more common, and has a big effect on the amount of project that can be built, but it does introduce a new way of doing business in Washington.

## Next Steps

The comprehensive tolling study continues with evaluation of more illustrative examples intended to provide additional policy insights. The ongoing Congestion Relief Analysis study by WSDOT will provide some insights into some broader systems of toll lanes and road pricing in the Puget Sound region. We propose the following additional analysis in this tolling study:

1. **SR 520/I-90** – Evaluate one more scenario of modest time-of-day pricing concepts.
2. **Alaskan Way Viaduct** – This was referenced in the legislation that funded this study. It has been studied before as a toll project. We will build upon that previous work to give it context to the policy framework emerging from this study.
3. **Toll I-5 from downtown Seattle south to I-405 to pay for rehabilitation.** I-5 is in need of costly rehabilitation, and is the first of many freeways in the region in such need. We will investigate the potential of tolling the entire corridor after the rehabilitation to fund some of the cost.
4. **Statewide Truck Tolling** – Germany recently rolled out a statewide, GPS-based truck tolling system. We will look at the pros and cons of a similar system in Washington State, and the implementation considerations.
5. **Enhanced Bus/HOT System** – One of the potential benefits of HOT lanes is keeping a high-quality, congestion-free lane for express buses. WSDOT is studying a BRT system with enhanced bus service in the I-405 corridor. We would build upon this analysis by investigating how allowing SOV to buy into these lanes would change performance.

Other projects, such as conversion of the I-5 express lanes in Seattle to HOT lanes, the Columbia River Crossings, and charging freight container fees at port gates will be discussed in more conceptual terms.

## Snoqualmie Pass

Snoqualmie Pass on I-90 has significant improvement needs, including widening to a six-lane freeway, longer truck climbing lanes, reconstructed interchanges, and safety improvements to increase slope stability and sight distance. The intent of tolling is to raise revenue for the significant capital improvements, plus significant maintenance and operational expenses. This analysis assumed one-way toll collection eastbound near North Bend and westbound direction near Cle Elum, so that traffic accessing the pass was tolled along with through traffic.



- Improvement cost = \$300 to \$600 million
- Annual maintenance cost = \$3.1 million
- Traffic very insensitive to tolls due to nature of alternative routes
- With a \$4.00 toll each way in 2010, and annually adjusted for inflation, the revenue stream could fund operations, special maintenance, plus about \$513 million in capital
- Benefits of this project are the ability to fund the safety and capacity improvements.

### Policy Findings

This scenario tests the potential to toll an existing facility to generate funding for capital improvements, maintenance, and operations.

Snoqualmie Pass has significant capital and ongoing maintenance needs, just like some of the major bridge crossings in the State. Tolling is a reasonable approach to raising funds for these critical improvements, just like on the bridges.

Improvement plans are well advanced, meaning that the improvements and the tolls could be implemented reasonably soon.

Since it is not an urban corridor, we expect a high percentage of nonfrequent users – this points to the need for some level of manual toll collection in addition to electronic toll collection (similar to the Tacoma Narrows Bridge).

The toll of \$4 was chosen for illustrative purposes. Since the toll is not expected to have a big impact on traffic levels across the pass, the toll rate could be sized to meet the capital needs. The revenue estimates assume annual inflation of the toll rate and bonding.

## SR 704 Cross Base Highway

The Cross-Base Highway (SR 704) would be a new six-mile-long, four-lane highway crossing McChord Air Force Base and Fort Lewis Military Reservation. The highway would connect I-5 at the Thorne Lane Interchange with 176<sup>th</sup> Street at SR 7. The project would include four intermediate access/egress points of which three would have signalized intersections. Tolling is being considered as a potential source of funds to help pay for the highway project. A single toll collection point was assumed just west of the interchange at “A” Street. Collecting tolls at this location would provide people going to or from either of the bases toll-free use of the highway. Since this is an urban project, and tolling would not begin for several years, we assumed all-electronic toll collection, meaning no manual toll booths.



- Capital cost: of \$226.3 million.
- Typical users can expect to save 5-10 minutes and 1-4 miles in 2030.
- \$1.40 passenger car toll rate each way suggested in 2011.
- Revenue stream would cover \$34 million toward construction, or 15 percent of the total.

### Policy Findings

This scenario tests the potential to finance a new highway corridor by tolls.

Tolling makes a modest contribution to the funding for this particular project. The tolling arrangement that gives toll-free access to the military installations and American Lakes Garden cuts down considerably on revenue potential. Due to the nature of the project and the relationship of the project to the military installations, it was not deemed feasible to expand the tolled area to include the entire facility.

There are few new highway projects expected in Washington State. Most of the capital needs in the State are rehabilitation and widening. From a geographic and social equity standpoint, it may not be fair to charge tolls on this highway and on no others in the State.

## SR 520 and I-90

The SR 520 and I-90 are the only Lake Washington crossings. SR 520 improvements are needed to reduce the risks associated with storm and seismic damages, and additional capacity is needed. Improvements on SR 520 bridge have been extensively studied by WSDOT, including various tolling options. In looking at Lake Washington crossings for this project, we defined a tolling strategy that would play a role in traffic management, as well as raise revenue for construction. We chose a scenario that would improve and toll both SR 520 and I-90. On SR 520, the assumed improvement was to widen the bridge to two general purpose lanes and one HOV 2+ lane in each direction. The I-90 improvement would include the addition of one HOV 2+ lane in each direction to the outside roadway (R8A design).



- In 2030, keeping traffic across Lake Washington close to 45 mph would require very high prices (over \$11.00 each way in the peak hour). These tolls would improve Bellevue-Seattle peak travel times on SR 520 by 12 minutes. However, the system as a whole would suffer, due to significant rearrangement of traffic flow.
- More moderate flat tolls (say \$1.50 each way) would also improve trans-lake travel times because of the capacity enhancement, but with less disruption of historical travel patterns.
- Tolls on both bridges could be expected to contribute \$967.4 million to capital improvements, about 39 percent of the amount needed for SR 520 alone.
- Additional analysis is needed to determine the implications of tolling both bridges as a system versus just SR 520.

### Policy Findings

This scenario tests the potential of tolling more than one facility as a system to both manage traffic and raise revenue.

Pricing can be effective at managing flow on an individual facility or system of facilities. However, changes in travel patterns at other locations around the network could offset any of the gains in that one particular corridor. This emphasizes the policy recommendation that system impacts be fully considered. More moderate levels of time-of-day pricing may be effective at encouraging some changes in travel behavior without disrupting the rest of the system.

One question we have not definitively answered is whether tolling both SR 520 and I-90 is needed to maintain balance in the Trans-Lake system. As traffic grows over the next decade or two, congestion on both sides of the Lake will be such that I-90 will be less of a diversion route for most trips. Regardless, there is a compelling argument that the entire Trans-Lake corridor should be treated as a system, including transit, and that a consistent policy on tolls should be applied if only to achieve geographic equity.